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Patent No. 6,764,555

Request for Cert. of Correction dated November 2, 2004

Attorney Docket No. 2204-011501

10004919

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent No. : 6,764,555 *B2* Confirmation No. 9828  
Inventors : Hiramatsu et al.  
Issued : July 20, 2004  
Title : High-Strength Austenitic Stainless Steel Strip  
Having Excellent Flatness and Method of  
Manufacturing Same  
Examiner : Deborah Yee  
Customer No. : 28289

**Certificate**  
NOV 09 2004  
**of Correction**

REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT  
FOR PTO MISTAKE (37 C.F.R. 1.322(a))

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

ATTENTION: Decision and Certificate of Correction Branch  
Patent Issue Division

Sir:

In accordance with 35 U.S.C. §254, we attach hereto Form PTO/SB/44 and a copy of proof of PTO error(s) and request that a Certificate of Correction be issued in the above-identified patent. The following errors appear in the patent as printed:

Column 4, Line 23 to Column 4, Line 28, Paragraph beginning "Each of REM" and ending "cleanliness of the steel" should be placed before the paragraph beginning at Column 4, Line 34 that begins with "The newly proposed steel strip".

(See the original specification, page 6, lines 25-28 and the Preliminary Amendment of 12/03/2001, page 9, first replacement paragraph.)

Respectfully submitted,

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24 NOV 2004

**UNITED STATES PATENT AND TRADEMARK OFFICE  
CERTIFICATE OF CORRECTION**PATENT NO. : 6,764,555 *B2*

DATED : July 20, 2004

INVENTOR(S) : Hiramatsu et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 4, Line 23 to Column 4, Line 28, Paragraph beginning "Each of REM" and ending "cleanliness of the steel" should be placed before the paragraph beginning at Column 4, Line 34 that begins with "The newly proposed steel strip".

{W0150103.1}

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PATENT NO. 6,764,555 *B2*

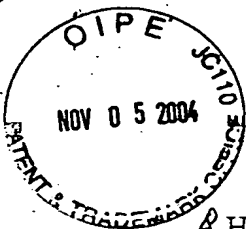
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This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

24 NOV 2004



PA ~~A HIGH-STRENGTH AUSTENITIC STAINLESS STEEL STRIP~~ <sup>HAVING</sup> EXCELLENT

~~IN FLATNESS OF SHAPE AND ITS MANUFACTURING METHOD OF~~ <sup>MANUFACTURING SAME</sup>

## BACKGROUND OF THE INVENTION

5 The present invention relates to a high-strength meta-stable austenitic stainless steel strip composed of a dual-phase structure of austenite and martensite <sup>exhibiting</sup> excellent ~~in flatness of shape~~ with Vickers hardness of 400 or more <sup>The invention</sup> and also relates to a manufacturing method thereof.

10 Martensitic, work-hardened or precipitation-hardened stainless steel has been <sup>typically</sup> used ~~so far~~ as high-strength material with <sup>a</sup> Vickers hardness of 400 or more.

PA Martensitic stainless steel such as SUS 410 or SUS420J2 is ~~material~~ hardened by quenching from a high-temperature austenitic phase to induce martensite transformation. Since the steel material is adjusted <sup>a</sup> to Vickers hardness of 400 or more by heat-treatment such as quenching-tempering, its manufacturing process necessitates such the heat-treatment. The steel strip unfavorably reduces its toughness after quenching and changes its shape due to the martensite transformation. These disadvantages put considerable restrictions on manufacturing conditions.

20 Work-hardened austenitic stainless steel such as SUS 301 or SUS 304 is often used instead, in the case where deviation of shape causes troubles on usage. The work-hardened austenitic stainless steel has an austenitic phase in a solution-treated state and generates a deformation-induced martensite phase effective for improvement of strength during cold-rolling thereafter.

25 <sup>the surface</sup> Although ~~a shape~~ of a steel strip is flattened by cold-rolling, dependency of hardness on a rolling temperature is <sup>great</sup> too big, and the ~~shape is irregularly varied~~ <sup>surface flatness varies irregularly</sup> along a lengthwise direction of the steel strip. <sup>for rolling direction</sup> ~~In this consequence~~ <sup>As a</sup> result, it is difficult to <sup>uniformly</sup> flatten ~~the shape~~ of the steel strip under stable conditions by cold-rolling from ~~an~~

Ti up to 0.50 mass %

5 Ti is an optional alloying element, which promotes age-hardening and improves strength during reversion. However, excessive addition of Ti above 0.50 mass % causes occurrence of scratches on a surface of slab and troubles on a manufacturing process.

Nb up to 0.50 mass %

Nb is an optional alloying element, which improves strength during reversion but degrades hot-workability of a steel strip. In this sense, Nb content shall be limited to 0.50 mass % or less.

10 Al up to 0.2 mass %

Al is an optional alloying element, which serves as a deoxidizing agent in a steel-making step and remarkably reduces type-A inclusions harmful for press-workability. The effects of Al are saturated at 0.2 mass %, and excessive addition of Al causes other troubles such as occurrence of surface flaws.

15 B up to 0.015 mass %

pp B is an optional alloying element effective for inhibiting <sup>the</sup> occurrence of edge cracks, which are derived from a difference of deformation resistance between  $\delta$ -ferrite and austenite at a hot-rolling temperature, in a hot-rolled steel strip. However, excessive addition <sup>of</sup> B above 0.015 mass % causes <sup>somewhat</sup> generation of low-melting boride and ~~rather~~ deteriorates hot-workability.

REM (rare earth metals) up to 0.2 mass %

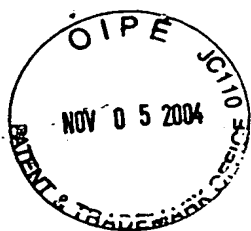
Y up to 0.2 mass %

Ca up to 0.1 mass %

Mg up to 0.1 mass %

25 Each of REM, Y, Ca and Mg is an optional alloying element, which improves hot-workability and oxidation resistance. Such the effects are saturated at 0.2 mass % REM, 0.2 mass % Y, 0.1 mass % Ca and 0.1 mass % Mg, respectively, and excessive addition <sup>of</sup> these elements <sup>worsen the</sup> ~~worsens~~ cleanliness of steel material.

The newly proposed steel strip further includes P, S and O other than the



PATENT APPLICATION  
Attorney Docket No. 2204-011501

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Naoto HIRAMATSU : HIGH-STRENGTH AUSTENITIC  
Kouki TOMIMURA : STAINLESS STEEL STRIP HAVING  
Hiroshi FUJIMOTO : EXCELLENT FLATNESS AND  
Kenichi MORIMOTO : METHOD OF MANUFACTURING  
SAME

Serial No. Not Yet Assigned

Filed Concurrently Herewith

Pittsburgh, Pennsylvania  
December 3, 2001

PRELIMINARY AMENDMENT

Commissioner for Patents  
Washington, D.C. 20231

Sir:

Prior to initial examination, please amend the above-identified patent application as follows:

IN THE SPECIFICATION:

Please amend section headings and amend specification paragraphs as follows.

Please replace the title beginning at page 1, line 1 with the following rewritten title:

HIGH-STRENGTH AUSTENITIC STAINLESS STEEL STRIP HAVING EXCELLENT  
FLATNESS AND METHOD OF MANUFACTURING SAME

24 NOV 2004

Please replace the paragraph beginning at page 6, line 25 with the following rewritten paragraph:

Each of REM, Y, Ca and Mg is an optional alloying element, which improves hot-workability and oxidation resistance. Such the effects are saturated at 0.2 mass % REM, 0.2 mass % Y, 0.1 mass % Ca and 0.1 mass % Mg, respectively, and excessive additions of these elements worsen the cleanliness of the steel.

Please replace the paragraph beginning at page 6, line 29 with the following rewritten paragraph:

The newly proposed steel strip further includes P, S and O other than the above-mentioned elements. P is an element effective for solution-hardening but harmful for toughness, so that an upper limit of P content is preferably determined at a conventionally allowable level of 0.04 mass %. S content shall be controlled to a lowest possible level, since S is a harmful element which causes occurrence of ear cracks during hot-rolling. The harmful influence of S can be inhibited by addition of B, so that allowable S content is preferably determined at 0.02 mass % or less. O generates nonmetallic oxide inclusions, which worsens the cleanliness of the steel and harms press-workability and bendability. Hence, the O content is preferably controlled at a ratio of 0.02 mass % or less.

Please replace the paragraph beginning at page 7, line 12 with the following rewritten paragraph:

According to the present invention, a shape of a stainless steel strip is flattened by volumetric change during re-heating to induce a phase reversion from deformation-induced martensite, which is generated by cold-rolling, to austenite. For such a reversion, a value  $M_d(N)$  representing the stability of an austenitic phase against working is controlled in a range of 0-125 so as to generate deformation-induced martensite by cold-rolling after solution-treatment. The value  $M_d(N)$  shall be not less than 0; otherwise cold-rolling at an